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No. IV.

BARROWING OUT SOIL.

The SILVER VULCAN MEDAL was this session given to Mr. DAVID MATHEWS, Civil Engineer, for an improved mode of Barrowing out Soil; and the following communication has been received from him on the subject.

Bridlington Quay, Yorkshire,

SIR,

March, 1825.

I BEG leave to hand you, for the consideration of the Society for the Encouragement of Arts, Manufactures, and Commerce, a plan and description of a machine invented and adopted by me in clearing and deepening the harbour of Bridlington, or Burlington, in the county of York, for raising the earth to the top of the piers, which is applicable to the raising of earth and other matter required to be wheeled in barrows to any given spot of a higher level in the making of canals, locks, docks, railroads, &c. &c.

By this invention the very dangerous mode now in use, of a man following the barrow up, and returning before it down an inclined plane, by which many men have lost their lives, and others have been much injured, is avoided. The erection of the stage also is less expensive, and a greater quantity of work can be done in a given time.

Before explaining the invention, it will be necessary to

consider the plan at present in use (see fig. 1, plate VI.) When a barrow is filled, it is wheeled to a stage at the foot of an inclined plane: a rope or chain passing through a pulley, and over a roller at the top of the inclined plane, is brought down to the bottom, and fixed by a pair of slings, usually called barnacles, to the handles of the barrow; the loaded barrow, and a man following it, are then drawn up the inclined plane by a horse, to which the before-mentioned rope or chain leads. The like machinery is fixed at a due distance from this, in such a way, that while the horse proceeding one way draws up the loaded barrow and man following it on one stage, he lets down a light barrow and a man preceding it on the other, and the horse, by retracing his steps, brings a loaded barrow and man up, and lets a light barrow and man down on the alternate stages; so that, as the horse traverses backwards and forwards, the operations are performed alternately at each of the inclined planes. The stages are made about three feet wide, and placed at the angle of about 40° to 50° .

The objections to the plan now invariably practised are, that by the rope breaking, by the horse failing to perform his task, by the inadvertence of the driver, by the man's weight not being sufficient to keep the barrow at a proper angle, by any obstruction to the wheel's running on the inclined plane, by the feet of the man sliding, or by many other causes not necessary here to enumerate, which are very likely and do frequently happen, the man is compelled to relinquish his hold on the handles of the barrow, and is precipitated down the stage, and meets with very serious injury from the fall, if the accident does not prove fatal to him, by the loaded barrow falling upon him.

To remedy these objections, the present plan has been invented, and has been adopted with great success, which I proceed to describe. Plate VI. fig. 2. *aa* a plank, of the usual width, namely, ten or eleven inches, is laid at a small angle, sufficient to keep the barrow-wheel in contact with it; and two strips *bb* are spiked to the edge of this plank, so as to form a trough or groove for the wheel of the barrow to run in. Two pieces of quartering, or small spars, *cc* are fixed on each side, at a proper distance, to guide the handles, by which the barrow is kept in a proper position against the plank upon which the wheel runs. About ten or fifteen feet above the top of the plank and the stage where the loaded barrow is to land, a pulley *d* is fixed to a pole *ee*, through which the rope or chain is passed down to the barrow; to the end of the rope is fastened a hook, which goes into an eye *f* fixed upon the front of the barrow. A pair of slings or barnacles are slid upon the handles of the barrow, previously fastened to the rope at a proper distance, to keep the barrow in a right position to be drawn up the plane or plank, which is when the handles of the barrow are a little below a horizontal line with the wheel of the barrow while running up the plank. The rope, after passing over the pulley *d*, passes through another vertical pulley *g*, at a proper height to suit the draft of the horse. The same operation is performed by the horse traversing backwards and forwards as in the usual plan, viz. a loaded barrow is taken up and an empty one let down, except their being unaccompanied by a man. The pulley *d* is elevated so high as to let the rope from the barrow clear the bank, and yet incline so much inwards, that when the barrow clears the bank it swings in and lands itself, as shown by dotted

lines: the man has only to fix the ropes to the empty barrow, and wheel the full one away.

Upon examination, the committee, I flatter myself, will consider this invention worthy of their sanction, as by the adoption of it many lives may be preserved, and much injury prevented to men who may be employed in this kind of work.

I am, Sir,

A. Aikin, Esq.

Secretary, &c. &c.

&c. &c. &c.

DAVID MATHEWS.

26, Basinghall-street, London,

SIR,

March 26, 1825.

I BEG leave to inclose the certificate of Sir William Strickland, Bart., of Boynton, chairman to the trustees of Bridlington Harbour, relative to the invention which I have had the honour of communicating to the Society of Arts, &c., through you, and I shall be obliged by your laying it before the committee.

I am, Sir,

A. Aikin, Esq.

Secretary, &c. &c.

&c. &c. &c.

DAVID MATHEWS.

CERTIFICATE.

SIR,

Boynton, March 22, 1825.

I WITH pleasure afford my testimony in favour of the machine of which you claim the invention, and which was

made use of by you in deepening the surface of the harbour of Bridlington, and conveying the soil dug out of it over the surrounding piers. In my opinion, the machine is perfectly effectual to its purpose, simple in its operation, and attended with less expense in conducting the work, and with less hazard to the workmen, than the somewhat similar machines which have heretofore been used for such purposes. I had opportunities of seeing it in use during the whole time that the work was carried on, and till it was entirely finished, and believe no accident took place during the whole time, which could hardly have been expected had the usual machinery been employed, where a man was accustomed, I believe, always, to mount on a plank, along with the wheelbarrow, and descend with the same. This dangerous operation was entirely avoided here, where men so accustomed to mount on the plank were never employed, or looked for, or probably could easily have been met with had they been wanted.

I am, Sir,

&c. &c. &c.

WM. STRICKLAND.

*Mr. David Mathews,
Civil Engineer.*